RUTGERS
Center for Advanced Infrastructure and Transportation

QUARTERLY PROGRESS REPORT

Project Title:	HMA Pay Adjustment (2012-01)
RFP NUMBER: 2012-001	NJDOT RESEARCH PROJECT MANAGER: Nazhat Aboobaker
TASK ORDER NUMBER: TO 282 / RU Acct 4-34770	PRINCIPAL INVESTIGATOR: Hao Wang, Ph.D.
Project Starting Date: 07/01/2012 **Original** Project Ending Date: 07/01/2014 **Modified Completion Date:**	Period Covered: 1st Quarter 2013

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Task #	Task	% of Total	Fixed Budget	% of Task this quarter	Cost this quarter	% of Task to date	Total cost to date
1	Literature Search	2.21%	$ 5,223	0.00%	$ -	100.00%	$ 5,223
2	Evaluation of Current NJDOT QA Specification	8.47%	$ 20,010	30.00%	$ 6,003	60.00%	$ 12,006
3	Evaluation of Existing Performance-Related Specifications	9.84%	$ 23,252	0.00%	$ -	100.00%	$ 23,252
4	Development of Pay Adjustment Methodology	31.43%	$ 74,271	20.00%	$ 14,854	20.00%	$ 14,854
5	Acceptance Limits for In-Place Pavement Quality Characteristics	17.84%	$ 42,154	20.00%	$ 8,431	20.00%	$ 8,431
6	Development of Draft Specification	13.65%	$ 32,245	0.00%	$ -	0.00%	$ -
7	Evaluation of Draft Specification	15.16%	$ 35,822	0.00%	$ -	0.00%	$ -
8	Quarterly /Final Reports and Recommendations	1.40%	$ 3,333	0.00%	$ -	0.00%	$ -
9		0.00%	$ -	0.00%	$ -	0.00%	$ -
10		0.00%	$ -	0.00%	$ -	0.00%	$ -
11		0.00%	$ -	0.00%	$ -	0.00%	$ -
12		0.00%	$ -	0.00%	$ -	0.00%	$ -
13		0.00%	$ -	0.00%	$ -	0.00%	$ -
14		0.00%	$ -	0.00%	$ -	0.00%	$ -
15		0.00%	$ -	0.00%	$ -	0.00%	$ -
16		0.00%	$ -	0.00%	$ -	0.00%	$ -
17		0.00%	$ -	0.00%	$ -	0.00%	$ -
18		0.00%	$ -	0.00%	$ -	0.00%	$ -
19		0.00%	$ -	0.00%	$ -	0.00%	$ -
20		0.00%	$ -	0.00%	$ -	0.00%	$ -
	TOTAL	100.00%	$ 236,310		$ 29,288		$ 63,766

Blue text is entered once at the beginning of the project

Green text is updated ever quarter

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Project Objectives:
The objective of NJDOT 2012-01, *HMA Pay Adjustment*, is to search and critically evaluate the literature to determine how the HMA quality characteristics can best be incorporated into the existing NJDOT HMA pavement specification to produce a comprehensive and effective multi-characteristic acceptance specification that can be easily understood and implemented. Particular attention will be paid to methods to develop a simple but scientifically-based performance-related pay adjustment methodology to produce a new specification that is practical and effective, fair to both the highway agency and the construction industry, and legally defensible. It is expected that successful completion of this project will significantly advance the asphalt technology development in NJ and extend the service life of flexible pavements.

Project Abstract:
The research plan is broken down into eight major tasks including literature search and reporting and recommendation. An extensive literature review will be first conducted to review previous research studies related to the project topic and the QA specifications and pay adjustment used by other states. The research team will then perform an assessment of New Jersey's current pay adjustment methodology by looking at actual QA data and their performances. After analysis and NJ specific considerations, the research team will develop a pay adjustment methodology that relate HMA quality factors and pavement performance and the acceptance limits for in-place pavement quality characteristics (such as longitudinal joint density and bond strength). Finally, the research team will submit a draft specification for discussion with NJDOT, which will then be evaluated through a pilot project system.

1. Progress this quarter by task:

Task 1- Literature Review
This task has been completed. During the quarterly meeting on 09/18/2012, the PI summarized the literature review results related to the project topic to the NJDOT customers. A draft literature review report – *Quality Assurance and Performance-Related Pay Adjustment* has been submitted to the customers for their comments.

Task 2 Evaluation of Current NJDOT QA Specification
The research team has worked with NJDOT staff and identified six existing projects for analysis. QA data were acquired from the Bureau of Materials and pavement performance data were acquired from Pavement Management and Drainage Unit.

The research team conducted the following analysis for the selected projects:

1. Identify the range of within-lot and between-lot variability in air void and layer thickness;
2. Analyze the range of pay factors for air void and total layer thickness;
3. Examine if there is reasonable correlations between the quality measure, pay factor and pavement performance.

Task 3 Evaluation of Existing Performance-Related Specifications
This task has been completed. The research team evaluated the applicability of using the Quality-Related Specification Software (QRSS) that is developed by NCHRP 9-22 project for HMA pay adjustment. The concerns and disadvantages of directly using the QRSS for pay adjustment were identified.

Task 4 - Development of Pay Adjustment Methodology
This task has been started. The research team used the QA data in the selected projects to compare the pay factors calculated using different pay adjustment methods, including the current NJ specification, the empirical PRS method developed by Weed, and the QRSS method developed under NCHRP 9-22 project.

Task 5 - Acceptance Limits for In-Place Pavement Quality Characteristics
This task has been started. The first step is to review literature and other agencies' specification or experience on the longitudinal density and bond strength.

Task 6 - Development of Draft Specification
NA

Task 7 - Evaluation of Draft Specification
NA

Task 8 - Report and Recommendations
NA

2. Proposed activities for next quarter by task:
Task 1- Literature Review
NA

Task 2 Evaluation of Current NJDOT QA Specification
The subcontractor will evaluate the current NJDOT QA specification using SpecRisk software, which was developed by Richard Weed in an early FHWA project and recommended by FHWA for implementation in QA process. The evaluation will include the seller's and buyer's risk analysis, constructing Operation Characteristic (OC) curves, evaluation of Acceptable Quality Level (AQL) and Rejectable Quality Level (RQL), effect of sample size, and etc. The subcontractor will submit a technical memorandum to the PI that summarizes the analysis results.

Task 3 Evaluation of Existing Performance-Related Specifications
NA

Task 4 - Development of Pay Adjustment Methodology
The research team will start developing a performance-based pay adjustment methodology based on long-term pavement performance prediction and life cycle cost analysis. Two alternative methods will

be explored and compared. The first method is based on mechanistic-empirical pavement performance analysis using DARWIN-ME and probabilistic simulation. The second method is based on PD-based empirical pavement performance model.

Task 5 - Acceptance Limits for In-Place Pavement Quality Characteristics
After the review of literature and other states' experience and specifications on longitudinal joint density and bond strength, the research team will discuss with NJDOT to select several pavement construction projects for testing. The testing plan will include the field and laboratory tests of longitudinal joint density and the laboratory test of bond strength.

Task 6 - Development of Draft Specification
NA

Task 7 - Evaluation of Draft Specification
NA

Task 8 - Report and Recommendations
NA

3. List of deliverables provided in this quarter by task (product date):
Presentation of Pay Adjustment Methods, March Quarterly Meeting

4. Progress on Implementation and Training Activities:
N/A

5. Problems/Proposed Solutions:
The fully executed task order was received on late January. The subcontract to AID is expected to be issued in March. This has delayed the work conducted by the subcontractor.

Total Project Budget	$236,310

Year 1 Budget	$106,203
Year 2 Budget	$130,107
Total Project Expenditure to date	$63,766
% of Total Project Budget Expended	26.98%

NJDOT Research Project Manager Concurrence: _____ Date: _____